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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/543,612	04/05/2000	Brian T. Cunningham	DR-308J	6510

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Joseph S Iandiorio
Iandiorio & Teska
260 Bear Hill Road
Waltham, MA 02451-1018

EXAMINER
CHAPMAN JR, JOHN E

ART UNIT	PAPER NUMBER
2856	10

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/543,612	Applicant(s) CUNNINGHAM et al.
	Examiner John Chapman	Art Unit 2856

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *three* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jan 23, 2002 and Mar 22, 2002* .

2a) ☒ This action is **FINAL.** 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above, claim(s) *12-14, 20, and 21* is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-11, 15-19, and 22-25* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). *8*

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

DETAILED ACTION

1. Applicant is advised that should claim 24 be found allowable, claim 25 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 merely recites a desired result (measuring changes in mass in the subnanogram region) without providing any additional structure for obtaining the desired result. Accordingly, the desired result is either inherent in the apparatus of claim 1, in which case claim 23 fails to further limit claim 1, or requires additional structure for obtaining the desired result, which additional structure should be positively recited in the claim.

4. Claims 1-3, 5, 7-8, 15, 17-18 and 22-23 are rejected under 35 U.S.C. 102(b) as being anticipated by White et al. (5,218,988).

White et al. discloses a sensor for measuring the mass of a substance on a membrane (col. 11, line 61-68).

Regarding claim 2, White et al. discloses a plate wave resonator in Fig. 11a having a membrane layer 111 whose resonant frequency is determined by the properties of the surrounding environment, including the mass of a loading fluid.

Regarding claim 5, feedback amplifier 25 in Fig. 1 comprises an oscillator device for driving membrane 22 at a resonant frequency, a frequency counter 27 comprises a frequency detection device.

Regarding claims 8, 18 and 22, White et al. teaches use in an evaporation system (col. 11, line 68 to col. 12, line 4), which would appear to involve depositing a volume of volatile solution on the membrane and allowing the solution to evaporate.

5. Claims 4, 5, 6 and 23 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over White et al. ('988).

Regarding claim 4, White et al. teaches providing a plurality of transducers 109 (col. 15, line 9). The transducers appear to be piezoelectric and, if not, it would have been obvious to provide transducers comprising a piezoelectric layer 46 in Fig. 4.

Regarding claim 6, White et al. provides a gel 100 in Fig. 12 and fluid 115 in Fig. 17. It would appear necessary that the walls peripheral to membrane 22 form a cavity in order to confine the gel and/or fluid to the membrane, and, if not, it would have been obvious to form a cavity in order to confine the gel and/or fluid.

Regarding claim 23, the apparatus of White et al. appears to inherently be capable of measuring a change of mass of a substance within the subnanogram range, and, if not, merely to increase the range of sensitivity of the device would have been obvious.

6. Claim 11, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over White et al. ('988).

Regarding claim 11, it is well known in the art, and would have been obvious, to provide a means to display the mass of the substance. Note col. 11, lines 27-29.

Regarding claims 24 and 25, White et al. discloses a oscillator device 25 in Fig. 1 connected to a first transducer 23, and a frequency detection device 27 also connected to the first transducer 23. Accordingly, the only difference between the claimed invention and the prior art consists in connecting the frequency detection device 27 to the second transducer 24 instead of the first transducer 23. White et al. teaches preferably connecting the frequency counter at the output of amplifier 25 where the signal is greatest (col. 11, lines 24-27). Nevertheless, it would have been obvious (though less desirable) to connect the frequency counter 27 to the input of amplifier 25, and thereby to the second transducer 24, in order to detect the frequency of the Lamb wave.

7. Claims 8-10, 18-19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over White et al. as applied to claims 1 and 17 above, and further in view of Bowers.

The only difference between the claimed invention and the prior art consists in using the apparatus of White et al. to determine the concentration of a non-volatile residue. Bowers teaches providing a known volume of liquid 55 in Fig. 7 on SAW resonator 52 in order to measure the level of non-volatile residue in the liquid. It would have been obvious in view of Bowers to provide a known volume of a liquid on the sensor of White et al. in order to measure the level of non-volatile residue in the liquid.

Regarding claim 22, Bowers teaches depositing a volatile solution on the resonator. Note col. 12, lines 18-28.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over White et al. as applied to claim 1 above, and further in view of Ballato.

The only difference between the claimed invention and the prior art consists in providing an array of sensors. Ballato teaches providing an array of sensors in order to sense the presence of a plurality of chemical agents. It would have been obvious in view of Ballato to provide an apparatus comprising an array of sensors of White et al. in order to sense the presence of a plurality of chemical agents.

9. Applicant's arguments filed January 23, 2002, have been fully considered but they are not persuasive. Applicant argues that White et al. does not teach an oscillator device which is configured to output a signal to drive a membrane at a reference resonant frequency. However, White et al. clearly discloses an oscillator device, for example, feedback amplifier 25 in Fig. 1 and

oscillator circuit 90 in Fig. 11, which outputs a signal to drive membrane 22 in Fig. 1 and 111 in Fig. 11a at a resonant frequency which is referenced to the properties of the surrounding environment, including the mass of a loading fluid.

Applicant argues that White et al. uses a feedback arrangement to create oscillations. Applicant fails to explain why a feedback amplifier does not comprise an oscillator device, nor does applicant explain why oscillator device 90 in Fig. 11 does not comprise an oscillator device. If applicant is arguing that applicant uses an oscillator which is not part of a feedback arrangement, then applicant's argument is more specific than the invention claimed.

Applicant argues that White et al. operates at the frequency of Lamb waves, not the reference resonant frequency of the membrane. However, White et al. operates at frequencies from 1 to 200 MHZ (col. 6, lines 4-5), whereas the reference resonant frequency disclosed by applicant is 10 MHZ. Accordingly, the White et al. device operates at the same frequency as applicant's device, namely 10 MHZ. If applicant is arguing that applicant uses a wave which is not a Lamb wave, then applicant's argument appears to be unsupported by the specification. Applicant discloses transmitting a wave in the direction 42 in Fig. 3, and applicant does not indicate that the wave is not a Lamb wave. Furthermore, it is well known that generating Lamb waves at the resonant frequency of a membrane will cause the membrane to oscillate. See col. 15, lines 6-16, of White et al. Accordingly, applicant fails to distinguish applicant's device from that of White et al., either in the specification or in the claims.

Applicant argues that White et al. does not rely on the reference resonant frequency of the sensor. Such argument is ill founded. White et al. clearly measures changes in the resonant

frequency caused by a measurand in order to determine the value of the measurand. Hence, White et al. relies on the difference between the measured resonant frequency and a reference resonant frequency in order to determine the value of the measurand. To the extent that applicant is arguing that the frequency of the oscillator device is fixed at a reference resonant frequency which does not vary with mass loading on the membrane, then applicant's argument is more specific than the invention claimed.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sinha discloses a method for detecting the presence of coatings on metal surfaces comprising a transmitter 22 and receiver 24 in Fig. 6. Sinha also teaches using a single excitation frequency in col. 8, lines 64-66.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Chapman whose telephone number is (703) 305-4920.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

JOHN E. CHAPMAN
PRIMARY EXAMINER